REPORT ON CONSULTANCY FOR UPDATED EDITION OF THE STATE OF THE ART MONOGRAPH ON HANDPUMPS

May 16 - August 23, 1984

[redacted]

by Kah Lin CHONG

August 23, 1997

REPORT ON CONSULTANCY FOR UPDATED EDITION OF IRC TP 10 "HANDPUMPS".
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The period of the consultancy was between May 16 and August 23, 1984. The project involved travel to the U.S.A., Canada, England, Ethiopia, Kenya, India, Thailand, Bangladesh, Malaysia and Sri Lanka to collect information. In addition, there were two work periods at IRC in the Netherlands totaling over six weeks for review of the information available and preparation of the updated Monograph on Handpumps.

A brief report on each country visited follows:

1. UNITED STATES OF AMERICA (New York and Washington, D.C.) May 16 - May 21

1.1 UNDP - Mr. M. Potashnik

- Was given briefing on activities of UNDP handpump projects.
- Given access to UNDP Inter-regional Project (Amended Project) Document, March 19, 1984. This proved to be a useful document giving state of World Bank Projects at present and their preliminary conclusions. (This document is available at IDRC's Subject File 4146-32, office memorandum dated May 17, 1984 from S. Arlosoroff).
- He repeated World Bank's view that an update of monograph at this time was premature.

1.2 UNICEF - Mr. Biron

- Given overview of UNICEF activities.
- Had an interesting discussion on selection guide for wells.

From briefings of Mr. Potashnik and Mr. Biron, it appears that the India Mark II pump is being tried out in many countries in Africa. It will be interesting to see how the pump performs there as it is of relatively complex design and certainly not a VLOM pump.

1.3 USAID - Mr. E. McJunkin

- Agreed with proposed emphasis of update on maintenance, community participation and costs issues because principles of handpump have not changed.

- Emphasized that quality control was of prime importance in manufacture. Said that initial study by him indicated no correlation between quality and cost of pump.

- Felt that updated manufacturer's list and more photographs were necessary in the Monograph.

- Briefed me on USAID projects and Batelle pump. My impression was that problems remain and the pump had not achieved wide acceptance.

- Said that further laboratory tests on pump were being conducted in Georgia Tech but that he regrets the methodology of CA had not been adopted. In this and other meetings, I found that many people were accepting the CA's work without sufficient consideration of its suitability to their particular situation.

- Said that he felt three months was much too short a period for the work-at-hand.

2. CANADA (Ottawa and Montreal)
May 22 - May 24

2.1 IDRC

- Briefed on project.

- Reviewed documents/materials available at IDRC.

2.2 PEK - Mr. M. Kaine

- Was given briefing and visited manufacturing workshop.

- The design and use of material is interesting, especially the use of elastic polyurethane piston seal. I did not have opportunity of actually using the pump, so I cannot judge if the friction will be high (and pump heavy to use).

- The cast polyurethane pump stand is interesting, but I suspect that apart from demonstrating that it is possible to use plastics for this purpose, this will not have other effect. There does not seem to be any advantage (cost or performance) to justify wide usage of plastic pump stands.

- Recent modifications have been necessary and performance has improved as a result. The pump while promising has still to prove itself.

The costs are very high, in view of the manufacturing method. Low volume and high costs in Canada are the reasons. Mr. Kaine indicated that he was trying to arrange for local manufacture in Senegal.

3. THE NETHERLANDS (The Hague)
May 25 - June 5

IRC - Mr. Ebbo Hofkes

- My initial discussion with him indicated that he and IRC envisaged a more complete rewrite than I had expected from my briefing at IDRC.

- The structure of the document was agreed on by preparing a preliminary table of contents.

- Material available at IRC was reviewed and grouped together as an initial bibliography and reference source for each of the eight chapters.

- Despite my information to the contrary, Mr. Hofkes insisted that he had not been informed of my work and travel schedule, which he said did not allow for sufficient time for work at IRC.

- I told him that the itinerary was tentative and would only be finalized after he had made his suggestions. A revised itinerary was adopted, after consulting Dr. Sharp by phone.

- I was surprised when he raised the same issue again one day before my departure. He described the travel itinerary as "visits to IDRC projects". He stated that IDRC was not contributing its agreed part of joint work because of this. I reminded him that the new itinerary had been changed to include all his suggestions. I asked him if he wished to end the joint work, in view of his dissatisfaction. He said no.

- It was agreed before I left for the field trip that I would return with completed sections on plastics applications and manufacture. We agreed that I would concentrate on gathering information on the last four chapters of the book: Plastics, Installation, Maintenance and Manufacture during the trip.

- He said that he would prepare material while I was away.

4. ENGLAND (London)
June 6 - June 9

Consumer's Association - Mr. K. Mills, Mr. Wales

- Visited the CA laboratories at Goose Green.

- They said they saw two alternative approaches to handpump problem: (i) fit and forget philosophy and (ii) easy maintenance by villagers (VLOM). He believed it important to avoid in-between solutions.

- They believed that it is unlikely that a non-VLOM pump of present design can be modified to successful VLOM pumps. A fresh start is needed for new pumps.

- They agreed that the VLOM concept is not and should not be the only solution.

- Mr. Mills felt that there was a lack of work in investigating human energy consumption and ergonomics of using handpumps.

- Given a briefing of work on handpumps at CA, both in comparative testing and development of plastic designs.

- They see CA skills as being primarily in comparative testing. Mr. Mills expressed his concern that CA reports were being used too simplistically by some. He resented having to make number rankings of various handpump features.

- He felt that the tests/work at University of Malaya had a major weakness in not including handle assembly in tests. I have reservations about usefulness of laboratory testing of handle drives as it is impossible to duplicate the infinite number of ways of using (and misusing) the handle drive in the field.

- The CA's work in comparative testing of pumps is now so well known that while I do not see their test as being ideal, it will almost certainly be adopted increasingly as a standard requirement for any pump wishing to be considered by major programmes. This may prove to be a barrier to smaller pump manufacturers (including some local manufacturers in LDC's).

5. ETHIOPIA (Addis Ababa)
June 10 - June 12

5.1 University of Addis Ababa (Mr. Aseged Mammo)

- He indicated that he expects to produce more than the 120 pumps under the project sponsored by IDRC because the need and demand for pumps remains high.

- Little work is being done at present because of a delay in the contract.

- He expressed his dissatisfaction with use of plastics. Reasons:

  i) local pipes of poor quality, have had to use imported pipes;
  ii) only one local plastics manufacturer (nationalized) - and because of bureaucratic nature, will not be able to supply injection molded pistons and footvalves; and
  iii) great difficulty in importing solid plastic rod for machining into piston and footvalves.

- In view of these problems, he proposes to machine piston and footvalves from another material, possibly brass. I agree that there can be little justification for machining plastic pistons/footvalves except in development and research work.

- Considering the problems he faced, local manufacture of any plastic pump will not be possible in Ethiopia for some time.

5.2 Ethioplan Science and Technology Commission - Mr. Getaneh Yemane

- The meeting was at the request of Mr. Yemane. He described the need for greater coordination of projects in Ethiopia and for a multi-disciplinary approach. He suggested that IDRC might wish to utilize the services of ESTC as a coordinating body -- formally or informally. I agreed to relay the message back to IDRC.

6. KENYA (Nairobi)
June 13 - June 15

6.1 World Bank - Mr. D. Grey

Wide ranging discussion with main points:

- Quality Control important; fabricated steel (welded) easier than cast iron for traditional pumps.

- Believe strong case exists for use of direct action for handles, especially for shallow pumps.

- Importance of Apron design -- for maximum utility and community involvement.

- No general solution or universal handpump possible.

- Maintenance -- difficulty of existing system because they are interventionist (i.e. by outsiders) in nature. VLOM concept is choice by default because government cannot afford cost of alternatives.

Mr. Grey also offered to review any sections of the monograph that we might wish. He expressed the hope that it would still be possible to cooperate on a joint monograph in future. He has sent a telex to Mr. Hofkes, IRC, on this. I have suggested to Mr. Hofkes that we should ask Mr. Grey to comment on the chapter on Installation.

6.2 UNICEF - Mr. John Skoda

- Believes that high priority should be given to Local Manufacture and Installation because they are necessary for good Maintenance.

- Emphasized the need for good installation including masonry/ concrete work.

- Also said that from his experience in Bangladesh, sanitation of pumps and health related to number of users per pump. More danger of contamination if large number of users.

- See success of Bangladesh No. 6 pump and its maintenance system as due to "saturation effect" - the pump is everywhere. It is becoming an accepted and integral part of village life.

- Said that while VLOM suitable for some areas, other areas will need other level of referral (government or agencies) -- so not pure village-level.

- Suggests that Bangladesh experience shows that Ministries of Local Government better able to foster community participation than Ministries of Health or outside agencies.

6.3 UNEP - Mrs. Letitia Obeng

- While enthusiastic about the importance of community participation in handpump programmes, Mrs. Obeng's experience proved to be mainly administrative in nature and could not provide the type of information required for the monograph.

6.4 IDRC Consultant - Dr. E. Schiller

- Was briefed by Dr. Schiller on findings of his recent visit to Malawi. I subsequently received a copy of his Trip Report while at IRC, The Hague.

6.5 IDRC Officer - Mr. J. Chauvin

- Mr. Chauvin briefed me on the findings of his trip to Zimbabwe. I received a number of useful documents collected by him, as well as a copy of sections of his Trip Report on Zimbabwe, later at The Hague.

6.6 African Medical Research Foundation (AMREF) - Dr. Greenacres

- The interview with Dr. Greenacres was very interesting because he was not in favour of the use of handpumps. His previous experience had been that handpumps were unreliable. Nevertheless, AMREF had begun installing handpumps (Blair) recently because they have received many offers of pumps from various agencies.

7. INDIA (New Delhi)
June 16 - June 18

Inalsa - Mr. Kalra

- Inalsa is by far the largest producer of India Mark II deep well pumps (about 40-45% of total production). It also manufactures shallow well pumps.

- They indicated that while they had done some very preliminary work to develop plastic components for the India Mark II (the primary purpose of my visit), but this had stopped. They cited work in this same area by UNDP/World Bank as the reason. They indicated that they were prepared to make any changes to their pumps or manufacture any new pump recommended by World Bank as their primary goal is to ensure good sales. They appeared quite content to leave the responsibility of further research and development to others (i.e. World Bank).

- Left New Delhi for Bangkok after only one working day (Monday, June 8, because personnel at the UN agencies were unavailable because of home leave.

8. THAILAND (Bangkok and Khon Kaen)
June 19 - June 24

8.1 Population and Community Development Association (PDA) - Dr. Pairojana

- Visited both the PDA office in Bangkok as well as their regional office and handpump sites in Khon Kaen province.

- Was briefed on activities of PDA in handpumps under the IDRC-sponsored project.

- Dr. Pairojana indicated that if the present project was successful, he believed it would be possible to expand the project in collaboration with the government.

- Visited a number of handpump sites in the field. This included both IDRC pumps installed and some of the Lucky pumps installed. The pump installation schedule has been delayed by one month because more IDRC pumps have not arrived from the University of Malaya. The pumps are expected with the month.

- Except for overtightening of the fulcrum arm, both IDRC pumps seem to have been well installed.

- The PDA's method of operations in general have centred on revolving funds. In the three forms of ownership schemes being tested, care should be exercised in ensuing that there is no bias towards paying (i.e. single or small group ownership) over non-paying (i.e. communal ownership) schemes.

8.2 ESCAP - Mr. Hoque

- The visit was made to obtain information on the project to accelerate manufacture of handpumps in the Asia-Pacific region. However, the project has yet to start because of delay in appointing a consultant. The main aim of the project is to increase handpump production in the region in the short-term.

8.3 UNICEF - Dr. Pricha Chulavachana

- Little noteworthy information arose from the interview. Dr. Pricha expressed his preference of good sanitary open wells over handpumps and believed women should be involved more actively in handpump programmes.

9. BANGLADESH (Dakha)
June 25 - June 26

World Bank - Mr. T. Journey

Had a very long and useful discussion with Mr. Journey over two days. The major points covered are summarized here.

- The simplicity and advantages of the direct action handle for handpumps was stressed many times. Mr. Journey said that he was preparing a paper presenting "The Case for Direct Drive Pumps" backed by some field data (to appear in World Bank's Technical Report #4). He indicated that we were free to quote from the report if Mr. Hofkes "did not change one word" and there was proper acknowledgement. He believes that direct drive pumps is the most promising development in recent years.

- He described the work done in developing the TARA pump. Emphasis was placed on easy maintenance and manufacture features in the various features of pump.

- Advantage of sealed buoyant pump rod.

- Recent modications proposed for India Mark II allow extraction of footvalve and piston through the pump head. These modications can be made without altering existing manufacturing equipment in any way. These changes will also reduce tool requirements.

- Discussion of philosophy of handpump design. Adequate statement of problems followed by design.

- Maintenance Issues. He sees key elements as:

  i) Simplicity of design
  ii) Provision of tools
  iii) Distribution of spare parts
  iv) Caretakers

  Says that 80% of handpumps in Bangladesh working, with the figure of 96% if only working wells are considered (i.e. clogged wells excluded). General discussion of maintenance system in Bangladesh.

- Manufacturing. UNICEF's method of prequalification of handpump manufacturers was described. Quality Control achieved through constant efforts of UNICEF. He believed that foundries (casting from parts) should be eliminated wherever possible - preferring to parcel out and assemble pumps. Simplicity of design and reducing number of parts was emphasized. Use of semi-finished parts (e.g. pipe fittings) helped by transferring part of responsibility of manufacturing process to others.

- Pump platform (or apron). He sees handpumps as a point source and sees the need to encourage on-site usage rather than secondary storage through apron design.

- Reliability of handpumps achieved through:

  i) Redundancy approach - install more than one pump
  ii) Quality or well made pumps

- Was given a history of usage and development of plastic handpumps.

- Agreed with idea that plastics usage represents a concept rather than just a simple materials choice issue.

10. MALAYSIA (Kuala Lumpur)
June 28 - July 14

10.1 Department of Mechanical Engineering, University of Malaya (U of M) - Professor Goh S.Y., Dr. Tee T.T.

- A major portion of the time in Malaysia was spent developing and writing the material that constitutes Chapter 5 on Plastics Applications in Handpumps and a large part of Chapter 8 Local Manufacture.

- I was briefed by Professor Goh on the current IDRC-sponsored project. Good progress appeals to have been made, and production is only one month behind original schedule.

- Professor Goh indicated that the Ministry of Health was likely to purchase a further 500 pumps in addition to the 500 pumps being installed under the project.

- Both Professor Goh and Dr. Tee were given drafts of the plastic sections for their comments.

- Visited both manufacturing and assembly workshop, as well as new model IDRC-UM demonstration pump on the U of M campus.

10.2 Faculty of Economics (U of M) - Dr. Tan B.T.

- No additional information for economic analysis was available because Dr. Tan's input comes in the latter part of the project.

10.3 Department of Geography (U of M) - Dr. Low K.S.

- Was briefed on progress in Malaysian section of IDRC-sponsored Manual for Handpumps project. Dr. Loh indicated that the comprehension level achieved with manual in Malaysia was lower than that of other countries (Philippines, Thailand and Sri Lanka) in the group. This was somewhat surprising because of the relatively better education standards in Malaysia. She has proposed the use of video cassette as a possible knowledge transfer method.

Sections on plastic of the monograph were completed as planned.

11. SINGAPORE
July 15

IDRC Regional Office - Mr. Lee K.W.

- Briefed Mr. Lee on IDRC projects in Malaysia and Thailand.

12. SRI LANKA (Colombo)
July 16 - July 18

Sarvodaya Shramadana Movement - , Mr. Sathis de Mel

- Visited the Sarvodaya office and training centre in Morutuwa.

- Was briefed on IDRC-sponsored project for manufacture of handpumps by village women. The trainees have been divided into two groups with one group receiving training in masonry at the construction site of future village workshop and the other receiving machine workshop training at the Morutuwa centre.

- It was reported that the training was progressing very well and that the village girls were performing and learning better than male trainees.

- I see little justification for the present method of welding plastic PVC sheets together for machining into piston and footvalve blocks. This method basically removes any advantage from the use of plastics.

- The Sarvodaya movement appears not to have been kept informed of the concurrent/parallel project to develop an installation, maintenance and repair manual for the pump. I was unable to meet Brigadier (or Colonel?) Dennis Hapugala of Community Development Services ("Suwa Sevana") who apparently is conducting this project in Sri Lanka. It is difficult to see how an effective manual can be developed without more coordination between the two bodies.

13. THE NETHERLANDS (The Hague)
July 19 - August 19

13.1 IRC - Mr. Ebbo Hofkes

- Mr. Hofkes was on leave for the first two-and-a-half weeks of this period. However, I was able to meet and discuss matters with him shortly after my return.

- I briefed him orally on my field trip.

- He presented me with a draft document that he said he had prepared while I was away. This draft included material on all sections except Plastics Manufacturing. He suggested that I use this draft in my work.

- This draft incorporated Mr. McJunkin's book with additional material. The draft was a significant step forward from Mr. McJunkin's book. I used it as the basis of my work.

- I prepared a complete draft monograph. Major changes and differences from the initial draft prepared by Mr. Hofkes were in:

  i) Section on Cost Analysis (in Chapter 2).
  ii) Chapter 5 on Application of Plastics in Handpumps.
  iii) Chapter 6 on Installation of Handpumps.

iv) Chapter 8 on Manufacturing particularly in Quality Control and Plastics Manufacture.
v) Chapter 7 on Maintenance.

- Work on Chapters 1, 3, and 4 required less changes because of their 'technical' nature.

- Regular discussions with Mr. Hofkes on the draft began on August 8, when he returned from leave. The significant events of the next two weeks are summarized here:

  i) I approached these discussions with intent of discussing and incorporating his comments/views on the document and producing a final draft.

  ii) Mr. Hofkes said that it was his responsibility to produce a draft acceptable to IRC for submission to IDRC. He stressed that it was IRC who had to submit a final draft to IDRC.

  iii) This difference in view of the work-at-hand became apparent mid-way in this two-week period.

  iv) I continued to work on my draft, as well as presented and discussed the new versions of the draft chapters with Mr. Hofkes. A major portion of my work was incorporated into his "work-in-progress" draft, though inevitably, sometimes not in the manner I wished.

  v) An unfortunate characteristic of my discussions with Mr. Hofkes was his inclination to take comments on the draft personally. He often preferred to raise his 'complaint' on the lengthy field trip 'to visit IDRC projects' than to discuss differences on the draft. The range of subject matter in the book is very wide. He appeared to have little reticence in writing and arguing about issues where his knowledge was limited. I readily admit the limitations of my own experience in such areas as Maintenance (where I accepted much of Mr. Hofkes views) and Manufacture of Metal Pumps (where McJunkin's work remains valuable), as well as other areas.

- Selected Bibliography and General Bibliography were prepared from initial lists drawn up during my first period at IRC and added to by Mr. Hofkes and myself later.

- I was surprised by Mr. Hofkes disagreement when I stated that a large part of Mr. McJunkin's work continues to appear in the draft. In many cases, the change has been cosmetic (i.e. in language). It is arguable that Mr. McJunkin's original language is clearer.

- I submitted a copy of the final version of the draft I was working on to Mr. Hofkes before leaving IRC.

13.2 IRC - Mr. Dick de Jong (Information Division)

I had a number of informal conversations with Mr. de Jong and the following points emerged:

i) He was in agreement that the final document should be type-set for printing. He made a specific request to Mr. Hofkes that the draft be processed on word processing system compatible to easy type-setting. This request was not acted upon, and the current work-in-progress draft is on another word processing system. The final version of my draft is not on any system.

ii) He indicated that editorial work (for language) will be done at some stage.

iii) He requested a copy of my final draft, because he felt it might be useful in the editorial work. Mr. Hofkes objected strongly to this. I subsequently submitted a copy of my final draft to Mr. Tjook (the acting Director of IRC). Mr. de Jong had said that he had made the request on instruction of the Director, Mr. Van Damme, who was away on leave.

iv) Mr. de Jong also indicated that a photograph was being considered for the cover of the book.

v) I have indicated to Mr. de Jong that I would like to see more recognition of Mr. E. McJunkin's work than appears on the present work-in-progress draft's preface and acknowledgement.

13.3 Summary of Final Discussion with Mr. Hofkes (August 17)

A. General

i) I agreed to inform IDRC that the present document is a work-in-progress draft and that IRC would forward the ready proposed draft to IDRC in due course.

ii) I repeated IDRC's request that IRC suggest additional names of possible external reviewers. Mr. Hofkes said that the names of possible peer reviewers will be forwarded with the final draft.

iii) Mr. Hofkes indicated that a review meeting of senior staff of IDRC, IRC, UNICEF, World Bank, and possibly others later this year (November) would be quite useful.

iv) Mr. Hofkes said that the joint IRC/IDRC monograph has stirred up interest of people concerned. Mr. David Grey has suggested that "we should all join forces and publish a definitive monograph as a joint effort".

B. Monograph

i) I have given a copy of the final version of the draft I was working on to Mr. Hofkes. I have included a number of comments/suggestions within this draft.

ii) I summarize my main comments on the current work-in-progress draft below.

(a) Chapter 1: I consider the material near final, except for the suggestions I have made.

(b) Chapter 2: The material is in fairly presentable final stage.

(c) Chapter 3: The section on Examples of Handpumps can and should be reduced considerably. This is at present the longest chapter.
It is desirable to give adequate coverage to the work of CATR. However, I feel the present format may encourage misuse of CATR and other laboratory data, and a clear indication of the limitations of its applications is necessary.

(d) Chapter 4: I consider the material near final form.

(e) Chapter 5: I have strongly suggested an alternative presentation with greater emphasis on the concept or reasons behind the use of plastics in handpumps. This is important because many people do not understand why, when, and by whom, plastics should be used. Some factual errors remain.

(f) Chapter 6: Generally complete except I propose a slightly different order of presentation to allow the reader to follow the chapter in logical time sequence. More attention is necessary on social and usage aspects of pump platform design and construction.

(g) Chapter 7: The material presented here should be useful and complete.

(h) Chapter 8: I have written and suggested, and Mr. Hofkes indicated that he will include, a section on Quality Control. Otherwise the presentation is complete.

(i) General:

- Editorial work is required.
- Acknowledgement of sources of diagrams/photographs and other material should be made within text as far as possible.

- Many of the figures/diagrams require simplification for clarity.
- There is a need for better photographs.
- The present work is about 300 pages and should be reduced.

iii) I emphasize that these represent my comments on the current work-in-progress draft and not the final document that IRC has said it will send.

14. CANADA (Ottawa)
August 20 - August 23

- Debriefing and preparation of consultancy report.

15. FINAL COMMENTS

- I would like to make it clear that both the work-in-progress draft and my final draft include material prepared by Mr. Hofkes, Mr. McJunkin, and myself. Except for the differences indicated, they are quite similar.

- I have no personal objections to Mr. Hofkes' name appearing as joint author as well.

- I do feel that it would be necessary to study any final draft from IRC carefully, in particular the Plastics Applications chapter. Mr. Hofkes has said that he felt my version of this chapter is too "promotional". I disagree.

- I would be happy to read and comment on the final draft from IRC when it is available.

- Together with this report, I submit:

  i) a copy of the final version of the draft I have been working on;

  ii) the work-in-progress draft;

  iii) various documents collect during the field trip; and

  iv) photographs from visit to:
  - Thailand
  - Bangladesh
  - Sri Lanka